'Try it, and tell me what you think'

Jean-Marc Fleury

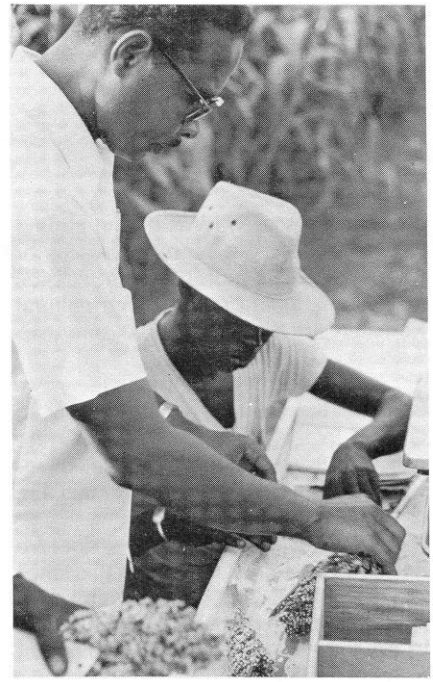

Photo: Neill McKee

Jacques Denis (left) weighing and classifying sorghum types on an experimental plot at CNRA.

"Once I was visiting a farmer in the area. He invited me to have a look at his field of sorghum. I collected a number of panicles and, on my return, weighed them in my laboratory. Exactly 114 of his panicles were needed to equal the weight of 100 of mine — although admittedly he had grown his variety without ploughing or fertilizers!"

Dr Jacques Denis, a plant geneticist from Haiti on assignment with the National Agricultural Research Centre at Bambey, Senegal, relates this anecdote to make a point. The farmer was particularly proud of this specimen, which produced 70 grams per panicle, and the plant was excellent.

However, this particular variety could only be grown at very low density, and would not respond to fertilizer. So the farmer's production was fixed at a very low level; half-a-ton per hectare while elsewhere sorghum production may reach three tons per hectare.

The farmer must increase his production if he wants to improve his standard of living. "But how do you convince him to abandon the plant he cherishes so dearly?"

For Jacques Denis, there is only one way. "You must go in all humility, with great sincerity, and tell him: Look, my friend, I've been growing this type. Try it and tell me what you think of it." The new variety, however, must bear some resemblance to the old one. The farmer prefers a tall plant because he uses the stalks to build his fences, cook his food and feed his animals. However, the more productive varieties of sorghum have a relatively short stalk since the nutritive elements of the soil are almost directly absorbed by the panicle. So the height of the sorghum must be reduced gradually while increasing its grain-bearing capacity as quickly as possible. "When his income improves, he should have enough money to purchase inexpensive materials for his fences."

During the three years he has conducted research at Bambey, Dr Denis has carried out numerous cross-breedings to produce varieties that meet the farmer's requirements. He has imported hundreds from America, Asia and other African countries. He has crossed them, sown them, recrossed them and resown them. During the 1974 winter season he observed some 28,000 plants, retaining 355 of them. During the 1976 winter season he selected the seeds of 500 plants from amongst 10,000. He normally conducts three harvests a year, one during the rainy season, and two others under irrigation.

Dr Denis' research projects, supported by the IDRC, have two main objectives, namely, obtaining early varieties with a 90-day cycle, and obtaining so-called 'late' varieties with a 125-day cycle. The grain from the early varieties must be exceptionally resistant to mildew, since these plants must mature and ripen under rainy conditions. This allows the farmer time for ploughing at the end of the rainy season with the advantage that he is able to sow his peanut crop earlier. Production from the 'late' varieties must be comparatively higher. They seem particularly appropriate for the south-central region of Senegal where winter extends over a four-month period.

Selection by production is based on two models: high production per surface area, and high production per plant. In the first model the aim is to obtain panicles weighing only 20 to 30 grams, but with a density up to 180,00 plants per hectare. Such a large number of plants offers an appreciable margin of safety and this type of production should suit the small farmer. In the second model by contrast, the target is only 50,000 to 80,000 plants per hectare. However, the panicles of these plants would weigh between 80 and 100 grams. Such sorghum would respond particularly well to fertilizers and would be more appropriate for the fairly sizable farm.

For selection on the basis of cycle and production, Dr Denis also tried to take into consideration resistance to mildew, insects, and *Ramulispora*, a serious foliar disease common in eastern Senegal.

After three years of research, he has obtained a 90-day variety with a short stalk about 1.5 metres in length, with an average of three tons per hectare. The 125-day varieties include a strain with a short stalk producing 2.5 tons per hectare, and a strain with a stalk 3.5 metres long producing close to three tons per hectare.

Such productivity clearly outranks the local farmers' performance. Certain problems do arise, however. For example, varieties with high production usually have a compact panicle. Unfortunately, this makes it a ready host for insects. It also offers a firm perch for ravaging birds. The variety grown by the farmers, on the other hand, produces a very pliable panicle and its spikelets are widely spaced. Insects cannot infest them and birds find them an uneasy perch. However, Dr Denis fully recognizes these problems and has already produced a fine, semi-compact, heavy-grain-bearing variety with long panicles.

His ambition, however, is not just to produce a sorghum variety which will be suitable for the small farmer. He hopes to communicate a little science to them also.

For example, even if the sorghum is self-pollinating (a plant which fertilizes itself because it possesses both male and female parts) some plants will be fertilized by others. The taller plants clearly have greater opportunity to benefit from this cross-pollination process and, consequently, nature seemingly favours plants with long stalks. If the farmer decides to adopt a variety with a short stalk, he must first learn to harvest the panicles with an eye to the wind. In this way he will maintain a degree of consistency in his seeds so that he can obtain a more uniform, and thus more marketable crop. If he is made aware of the role played by natural selection, he himself can then choose the most promising plants. "Right from the earliest beginnings," adds Dr Denis, "the farmer has performed a large part of the work of selection." □

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